



PATENT SPECIFICATION.

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COMPLETE SPECIFICATION

Improvements in or relating to Refrigerators.

I, GUYON LOCKE CROCHERON EARLE, a citizen of the United States of America, of 37, Greenway South, Forest Hills, Long Island, New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to refrigerators and more specifically to mechanical refrigerators suitable for domestic purposes.

In British Specification No. 581,121 there are disclosed refrigerators of the "set-back" type. In each of these refrigerators, the upper part, which contains the evaporator coils, has its front set back from the front of the lower part, a table-top member being provided above that portion of the lower part which is in front of the upper part. By deflecting or other means, the cold from the evaporator in the upper part is caused to refrigerate the interior of the lower part. Actual tests have shown that refrigerators of this type have a very uniform temperature throughout substantially the entire interior. The present invention is concerned with the provision of a refrigerator of the "set-back" type wherein a part or parts thereof can be made much colder than other parts thereof.

According to the invention there is provided a refrigerator comprising an insulated enclosure member adapted to be refrigerated, means for refrigerating said enclosure member, a smaller enclosure member within the first enclosure member, said smaller member comprising a stationary insulated member forming the top of said smaller member and an insulated drawer member adapted when in its closed position to fit fairly snugly against said top, said drawer member having its side and back walls and its bottom of insulating material, and means within or closely adjacent said top for refrigerating said smaller enclosure member.

The present invention also resides in a refrigerator in which an insulated outer refrigerated enclosure is adapted to contain

a plurality of drawers one of which has an insulated bottom and sides and is adapted to cooperate with an insulated member overlying said drawer and positioned so close thereto that it forms a top fitting fairly snugly over said drawer when the latter is in closed position, said drawer being adapted to be refrigerated by means independent of means circulating cold air through all the other drawers.

The present invention includes, by way of example for illustrative purposes, a refrigerator of the "set-back" type which is provided with evaporator coils in the upper portion thereof and, in addition, one or more additional evaporator coils in the lower portion thereof. The coil or coils in the lower portion can be in the same closed circuit with those in the upper portion or they can be in a different circuit. In one specific form of the invention, at least one of the coils in the lower portion is embedded in or is closely adjacent the insulation which forms the stationary top of a frozen food compartment, the front, back, bottom and side walls of the compartment (all of which are insulated) forming elements of a drawer which can be moved with respect to the top. When the drawer is in its normal position, a tightly insulated compartment is formed which can be refrigerated by the coil or coils in its top to temperatures below those of the rest of the refrigerator interior. In a modified form of the invention, the frozen food compartment can be a stationary compartment reached through a lid in the table-top member. The interior of the upper set-back part of the refrigerator can be sealed from that of the lower part of the refrigerator (thus relying on only the coils in the lower part of the refrigerator to cool this part) or left open to permit the circulation of cold air between the two major parts of the refrigerator, as desired. Switches or dials for the control of the degree of cold can be placed in the upper part or in the lower part or, if the coils in the upper part are in a different circuit from those in the lower part, in both upper and lower parts, thus permitting certain parts

of the refrigerator to be at greatly different temperatures than other parts thereof. While a variety of temperatures are possible in the interiors of many known commercial

5 refrigerators these temperatures are not subject to the individual controls possible in the refrigerator in accordance with this invention.

If the frozen food drawer should become
10 frozen to its supporting drawer well or guide member, it can be loosened in accordance with an exemplary form of this invention, by means of a rotatable cam which when turned by means of a handle
15 on the outside of the drawer, pushes against a horizontal plate carried from the refrigerator frame under the drawer and causes the drawer to be slightly lifted.

The invention will be more readily understood by referring to the following description taken in connection with the accompanying drawing forming a part thereof, in which,

25 Fig. 1 is a side cross-sectional elevation view of a refrigerator in accordance with this invention;

Fig. 2 is a front perspective of this refrigerator;

30 Figs. 3 and 4 are fragmentary views, partly in cross-section, of modifications of the refrigerator of Figs. 1 and 2.

Referring more particularly to the drawings, Figs. 1 and 2 show, by way of example for illustrative purposes, a refrigerator 10 of the "set-back" type constructed in accordance with this invention. This comprises a lower insulated refrigerated portion 11, an upper insulated refrigerated portion 12 the front of which is generally
40 in a plane which is behind the plane of the front of the lower portion 11, and a table-top member 13, preferably of stainless steel or monel metal, positioned on top of that part of the lower portion 11 which
45 is in front of the upper portion 12. The entire refrigerator is preferably mounted on a recessed base 14.

The upper portion 12 is provided with an evaporator 20 comprising coils 21 which are
50 connected by means of pipe 22 to the compressor condenser unit (not shown but preferably located beside the refrigerator) and by means of pipe 23 to one or more coils 24 located at the top of the lower refrigerated portion 11. The coil 24 is connected
55 through pipe 25 to the compressor-condenser unit. Within or adjacent the coils 21 are ice cube trays 26, 27, and 28 although the lower tray 28 may be replaced
60 by a wire mesh basket for supporting food, if desired. Positioned at the side of the evaporator 20 in the upper portion of the refrigerator are mesh shelves 29, 30 and 31 for the support of food. One of these, as for
65 example the shelf 30 preferably has a cut-

out portion, as shown in Fig. 2, so that very tall bottled drinks, or other articles having a height greater than the distance between shelves can be accommodated without turning them over on their sides. 70 Doors 32 and 33 are provided as closure members for the upper refrigerated portion 12.

The lower refrigerated portion 11 is provided with a plurality of drawers 40, 41, 42
75 and 43 to hold food and other articles to be refrigerated. If desired, one or more of the lower drawers 42 and 43 can be longer than the top one in order to provide better circulation of cold air to these lower drawers. 80 For a more complete description of set-back refrigerators employing drawers, reference is made to the above-identified British Patent Specification No. 581,121. In this Specification however, the cooling coils are
85 located entirely in the upper portion of the refrigerator (or substantially so) while in the present invention, much (if not all) of the cooling of the space in the lower portion 11 of the refrigerator is accomplished
90 by the coils 24 inasmuch as the upper portion 12 is preferably sealed from the lower portion 11 by means of the partition 44 although in one form of the invention, to be described below, this partition is removed
95 and cold air from the coils 21 is free to reach the lower portion 11 of the refrigerator.

While the drawer 41 may be similar to the drawers 40, 42 and 43, preferably, in
100 accordance with this invention, it is constructed in such a way as to form a frozen food compartment which is isolated from the rest of the refrigerator. The bottom 50, the sides 51, the rear wall 52, and the front
105 wall 53 are insulated as is also the horizontal member 54 overlying the drawer 41 and forming a top for the frozen food compartment 45. The member 54 has a downwardly projecting end 55 with a biased edge
110 which makes a close fit with the rear wall 52 of the drawer 41. Within or directly under the horizontal member 54 are one or more cooling coils 56 which may be connected in the same cooling circuit as the
115 coils 21 and 24 but preferably they are connected in a separate cooling circuit as indicated in Fig. 1. The coils 56 are connected to a compressor-condenser unit (not shown and which may be either the same unit or
120 a different one from that to which the coils 21 and 24 are connected) by means of the pipes 57 and 58. A control dial switch member 59 is located at any suitable point, such as, for example, on the front under-
125 side of the horizontal member 54 to control the degree of cold in the frozen food compartment 45 comprising the drawer 41 and the member 54. A dial switch 46 can also be provided for controlling the degree of 130

cold of the space cooled by the coils 21 and 24. If desired, separate cooling circuits can be provided for the coils 21 and 24. Moreover, the coil 24 can be connected in the same circuit as the coil 56, if desired.

The operation of the refrigerator shown in Figs. 1 and 2 will now be described. Refrigerant made to circulate through the coils 21 causes heat to be taken from the upper refrigerated portion 12. The cold dial or switch 46 controls the degree of cold in this portion. At the same time, by means of the coils 24 the lower portion of the refrigerator is refrigerated, the cold air from these coils dropping into the upper drawer 40 and also setting up a relatively rapid circulation or current of cold air in back of the drawers as indicated by the arrows in Fig. 1. Cold air is taken from this current and caused to flow into the two lower drawers 42 and 43. Moreover, as these drawers are preferably of metal, there is a transfer of cold by conduction. Radiation also assists in the refrigeration of the lower portion (and also the upper portion) of the refrigerator. By proper design of the length of the coils 21 and 24, the upper portion of the refrigerator can be made colder than the lower portion, or *vice versa*, even though both are in the same refrigeration circuit and are controlled by the same dial 46. As the frozen food compartment 41 is completely insulated from the rest of the lower portion of the refrigerator because of the snug fit between the drawer 41 and the top member 54, it can be, and preferably is, made much colder than its surroundings. Preferably the coils 56 used to refrigerate this compartment are contained in a separate refrigeration circuit from the coils 21 or 24 and are controlled by the separate control member or dial 59 but it is to be understood that the coils for the frozen food compartment 43 and coils 21 and 24 (or either one of them) can be in the same refrigeration circuit, if desired. In such a situation, the frozen food compartment can be made colder than its surroundings by providing a relatively larger coil surface per area to be cooled. By way of example, the temperature of the upper part of the refrigerator can be 35 degrees, that of the lower portion of the refrigerator exclusively of the frozen food compartment 40 degrees, and that of the frozen food compartment 15 degrees.

If the partition 44 between the upper and lower portions of the refrigerator is removed, the cold air from the coils 21 can also be used to help refrigerate the lower portion of the refrigerator as in the above-mentioned Earle patent.

Fig. 3 illustrates a modification of the refrigerator in Figs. 1 and 2. In the arrangement of Fig. 3, means are provided to

loosen the frozen food drawer from its drawer well, frame or guide if it should become frozen thereto. While this means may take any convenient form, in Fig. 3 it comprises a cam 60 mounted on a rod 61 which passes through the drawer front 62 and insulation 63 of the drawer 41 and has a handle 64 mounted on the rod on the outside of the drawer. Turning the handle causes the cam 60 to turn and force against a horizontal stationary plate 65 which is fastened at the side of the refrigerator to a mullion between drawers or to the side wall of the refrigerator, thus causing the rod 61 and hence the drawer bottom 50 to be raised slightly, breaking any ice seal that existed. The handle 64 and the cam 60 are returned to their normal positions by means of the spring 66 when the hand of the operator is released from the handle 64. The handle is preferably located at one of the lower corners of the drawer front.

Fig. 4 shows a stationary frozen food compartment 70 in the upper portion of the lower part of the refrigerator. This compartment has insulated side walls, front and back walls 71 and 72, top 73 and bottom 74. Pipes 75 and 76 leading to a compressor-condenser unit and forming evaporating coils are located in or adjacent to any of the walls, top or bottom. The cooling circuit can be independent of the other cooling circuit or circuits in the refrigerator. In Fig. 4, they have been shown in the bottom 74. Located in the table-top member 13 is a top 77 which is flush with the surface of the table top and has finger grips made therein so that it can be readily removed when access is desired to the compartment 70. The rest of the refrigerator will be like that shown in Figs. 1 and 2 with the upper drawer 40 being replaced by the compartment 70. If the compartment 70 is provided, the frozen food drawer 41 can be replaced by a refrigerator drawer like the members 42 and 43 if desired.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A refrigerator comprising an insulated enclosure member adapted to be refrigerated, means for refrigerating said enclosure member, a smaller enclosure member within the first enclosure member, said smaller member comprising a stationary insulated member forming the top of said smaller member and an insulated drawer member adapted when in its closed position to fit fairly snugly against said top, said drawer member having its side and back walls and its bottom of insulating material, and means within or closely adjacent said top for refrigerating said smaller enclosure member.

2. A refrigerator in which an insulated outer refrigerated enclosure is adapted to contain a plurality of drawers one of which has an insulated bottom and sides and is adapted to cooperate with an insulated member overlying said drawer and positioned so close thereto that it forms a top fitting fairly snugly over said drawer when the latter is in closed position, said drawer being adapted to be refrigerated by means independent of means circulating cold air through all the other drawers.
3. A refrigerator comprising a first insulated enclosure member adapted to be refrigerated, a second insulated enclosure member adapted to be refrigerated, said second member being smaller than said first member and positioned above said first member in such a way that the front of said second member is set back from and is substantially parallel to the front of said first member, a horizontal partition member between said first and second members, a plurality of drawers in said first member, evaporator means entirely in said first member for refrigerating said first member, and additional evaporator means entirely in said second member for refrigerating said second member.
4. A refrigerator according to claim 3, in which the partition serves as a bottom for the second member and a top for the first member.
5. A refrigerator according to claim 4, in which the partition is insulated.
6. A refrigerator according to any one of claims 3 to 5, in which the evaporator means are so proportioned that the temperature of the second member is lower than that of the first member.
7. A refrigerator according to any one of claims 3 to 6, including a table-top member on top of that portion of the first member in front of the second member.
8. A refrigerator according to claim 7, in which an opening is provided through the table-top member.
9. A refrigerator according to claim 1, in which the means for refrigerating the smaller enclosure member is independent of the means for refrigerating the larger or outer enclosure member.
10. A refrigerator according to claim 9, in which the means for refrigerating the smaller enclosure comprises cooling coils located in a cooling circuit different from that including the refrigerating means for the larger or outer enclosure member.
11. A refrigerator according to any one of the preceding claims, having means for loosening the drawer member or at least one of the drawer members when it gets frozen shut.
12. A refrigerator according to claim 1 or 9, in which separate controls are provided for the two refrigerating means pertaining to the enclosures.
13. A refrigerator according to claim 2, in which the means for refrigerating the drawer is stationary and located above the drawer.
14. A refrigerator according to claims 3, in which a stationary frozen food compartment is provided in the lower enclosing member.
15. A refrigerator according to any one of the preceding claims, in which one of the drawers is at least partly insulated from the other or others of the drawers and provided with means for refrigerating same independently of the means for refrigerating said other drawer or drawers.
16. A refrigerator substantially as hereinbefore described and shown in Figs. 1, 2 and 3 and Fig. 4 of the accompanying drawings.
- Dated the 2nd day of February, 1945.
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[This Drawing is a reproduction of the Original on a reduced scale.]

